



# Exploration on Teaching Reform of Water Conservancy Project Budget

Gaoyang Wu<sup>1,a\*</sup>, Rui Gao<sup>2,b</sup>, Peng Liu<sup>1,c</sup>, Kai Guo<sup>3,d</sup>

<sup>1</sup>Jinqiao College, Kunming University of Science and Technology, Kunming 650000 China

<sup>2</sup>Yunnan Agricultural University, Kunming 650000 China

<sup>3</sup>Yunnan New Chenxi Digital Technology Co., LTD., Kunming 650000 China

<sup>a\*</sup>308273103@qq.com, <sup>b</sup>958366743@qq.com, <sup>c</sup>13963142@qq.com,  
<sup>d</sup>84505032@qq.com

**Abstract.** "Water Conservancy Engineering Budget" is an important core course of water conservancy engineering and related majors, which has strong practicality, comprehensiveness and policy. However, the traditional teaching mode has many problems in teaching content, methods and practice links, and it is difficult to meet the demand for applied talents in modern water conservancy engineering industry. Based on the current development trend of water conservancy engineering industry and the background of local colleges' transformation to application-oriented undergraduate colleges, this paper discusses the teaching reform strategy of "Water Conservancy Engineering Budget Estimate" course, aiming to improve students' learning enthusiasm and practical ability by optimizing teaching content, innovating teaching methods and strengthening practical links. To provide reference for training high-quality applied talents to meet the needs of society.

**Keywords:** Water conservancy project; Budget estimate; Teaching reform; Applied talents

## 1 Introduction

With the rapid development of water conservancy engineering industry, the demand for professional talents has not only increased in quantity, but also put forward higher requirements in quality. As the core course of water conservancy engineering major, "Water Conservancy Engineering Budget Estimate" is of great significance for cultivating students' engineering economic analysis ability and practical skills. However, the traditional teaching mode has many problems in teaching content, methods and practice links, and it is difficult to meet the demand for applied talents in modern water conservancy engineering industry. Therefore, it is of great practical significance to carry on the teaching reform of the course "Water Conservancy Engineering Budget Estimate".

## 2 Course Characteristics

The course of Water Conservancy Project Estimation and Budgeting is a subject with strong theoretical and practical aspects, and it requires a broad and wide range of professional knowledge. It involves multiple related professional courses such as Engineering Drawing, Water Conservancy Engineering Construction, Construction Organization and Management of Water Conservancy and Hydropower Projects, and Hydraulic Structures. These courses complement each other. When teaching the Estimation and Budgeting course, it is necessary to systematically explain the relevant knowledge and principles, rather than proceeding independently without the related knowledge. This helps cultivate students' ability to think and solve problems comprehensively. <sup>[1]</sup>

## 3 Analysis of the teaching status of "Water Conservancy Engineering Budget Estimate" course

### 3.1 The Teaching Material Resources Lag Behind

At present, the content of the textbook "Water Conservancy Project Estimate Budget" used in most teaching is not updated in time, and can not reflect the latest policies, regulations and technical standards of the industry in a timely manner. For example, the Ministry of Water Resources issued Shui General [2024]323 document on December 11, 2024, "Notice of the Ministry of Water Resources on Issuing the Regulations on the Preparation of Hydraulic Engineering Design (Estimate) and a series of Quotas for Hydraulic Engineering" and other policy documents have not been fully integrated into the content of the textbook, resulting in the disconnection between students' knowledge and actual engineering needs.

### 3.2 Old Teaching Content

The content of the course is mainly theoretical knowledge and less practical content. In the textbook, the explanation of practical application content such as engineering quantity calculation and bill of quantities valuation is weak, and there is a lack of rich case analysis and practical operation guidance. The singleness and lag of this kind of teaching content make it difficult for students to combine theoretical knowledge with practical engineering, which affects students' learning enthusiasm and practical ability cultivation.

### 3.3 Single Teaching Method

Traditional teaching methods are mainly taught by teachers, and students passively accept knowledge, lacking active participation and interaction. This passive teaching mode is difficult to stimulate students' interest in learning, and is not conducive to cultivating students' independent learning ability and innovative thinking. In addition, the

teaching process lacks the cultivation of students' practical ability, and students often need to re-learn and adapt to actual work needs when they enter the workplace after graduation.

### **3.4 Weak Practice Teaching Links**

Practical teaching is an important part of the course "Water Conservancy Engineering Budget Estimate", but there are obvious deficiencies in the practical teaching link in most colleges and universities. On the one hand, the practical teaching content is disjointed from the actual project, and lacks the support of the real project; On the other hand, the time arrangement of practical teaching is unreasonable, and students can not fully carry out practical operation and practice. In addition, the school's insufficient investment in practical teaching resources, such as the lack of advanced computer software and training equipment, also limits the improvement of practical teaching effect.

## **4 The Teaching Reform Strategy of "Hydraulic Engineering Budget" Course**

### **4.1 Optimize the Teaching Content**

#### ***4.1.1 Update and Supplement Teaching Materials***

When ordering teaching materials, carefully compare and select the latest version of teaching materials. In the teaching process, combine the latest policies, regulations and technical standards of the industry to supplement the missing or lagging content in the teaching materials. Combined with the relevant knowledge points of the chapters, set relevant exercises for practice, knowledge points to learn and use actively, deepen students' understanding and mastery of knowledge points, so that students can apply what they have learned, and enhance the practicality and pertinence of the course. For example, you can refer to the latest documents and industry norms issued by the Ministry of Water Resources to update and supplement the contents of quota and pricing methods in the textbooks.

#### ***4.1.2 Integrate Teaching Content***

According to the training objectives of applied talents, integrate and optimize the course content, increase or reduce the teaching hours and depth of each chapter of the textbook, reduce the theoretical and narrative content, and increase the proportion of practical content such as engineering quantity calculation and bill of quantities valuation. At the same time, according to the actual engineering needs, representative cases and projects are designed to guide students to carry out independent learning and practical operation.

## 4.2 Innovate Teaching Methods

### 4.2.1 Use Case Teaching Method

Choose the actual water conservancy engineering cases that are suitable for the teaching content as the carrier, and combine<sup>[2]</sup>the theoretical knowledge with the practical engineering. Through case analysis and discussion, students are guided to actively think and solve problems, and students' engineering practice ability and innovative thinking are cultivated. For example, when explaining the bill of quantities valuation, the bill valuation case of a reservoir project can be introduced for students to analyze and compile.

### 4.2.2 Implement Project-driven Teaching Method

The course content is designed into several project tasks, and students work in small groups to complete the project tasks<sup>[3]</sup>. Through the implementation of the project, the students' teamwork ability and practical operation ability are cultivated. For example, it is possible to design a budget preparation project for a small water conservancy project, allowing students to participate in the implementation of the project from the calculation of quantities to the preparation of lists, and then to the determination of the total cost.

### 4.2.3 Make Use of Information-based Teaching Methods

The course of water conservancy engineering budget estimate has the characteristics<sup>[4]</sup> of detailed knowledge, strong theory, strong practice, and close connection with the national and industrial policies. Combining the course teaching with modern information technology, enriching the teaching means, so as to achieve the effect of improving the teaching quality. For example, when using multimedia teaching, teaching videos are added so that students can learn the structure of related engineering projects more intuitively, or mind maps are added to make the context of budget estimate knowledge points clearer, helping students better understand the complicated knowledge<sup>[5]</sup>points of budget estimate. Online course platform is used to add teaching videos of budget estimate courses, so that students can re-learn and supplement knowledge points after class; Virtual simulation software is used to simulate the on-site environment of water conservancy projects, so that students can carry out practical operation of budget estimation in the virtual environment, and enhance students' learning experience. Combined with BIM course, budget estimate teaching is assisted and optimized, so that students can master more advanced technology and skills and become talents<sup>[2]</sup>who can adapt to the development of society and industry.

### 4.2.4 Make Good Use of Digital Teaching Platforms

With the development of digitalization and intelligence, teaching platforms such as Rain Classroom, XuetangX, MOOCs of universities, and Learning Pass have emerged, providing a foundation for teachers to build online courses on budget estimation and create digital teaching knowledge bases. The rich teaching videos and animations on these platforms enable students to preview or supplement knowledge outside of class,

enhancing their understanding of the subject matter. The online testing function of these platforms breaks the limitations of traditional exams in terms of time and location. Teachers can randomly generate questions based on the class content, and students can take tests anytime and anywhere. Teachers can identify students' weak points based on their test scores and provide targeted explanations to improve teaching effectiveness. The bullet screen and discussion functions of these platforms enhance student interaction in classroom teaching. Students actively participate in classroom activities, raising questions or sharing ideas, allowing teachers to better understand students' learning status. By making good use of teaching platforms, students can study anytime and anywhere, thus enabling remote teaching and self-study of the course on budget estimation for water conservancy projects<sup>[3]</sup>.

### **4.3 Strengthen Practical Teaching Links**

#### ***4.3.1 Increase Practical Teaching Hours***

Reasonably adjust the proportion of teaching hours between theory teaching and practice teaching, and increase the hours of practice teaching<sup>[6]</sup>. For example, in theory teaching, practical teaching links such as in-class practice, course practice or course design should be arranged at the end of the term, so that students can have practical operation in time while learning theoretical knowledge.

#### ***4.3.2 Carry out School-enterprise Cooperation***

Strengthen cooperation with enterprises, establish off-campus practice bases, and provide practical engineering projects for students to practice and practice. Through school-enterprise cooperation, students can participate in the budgeting work of actual engineering projects, understand the actual needs of the industry and improve practical ability.

#### ***4.3.3 Introduction of Computer Software Teaching***

With the extensive application of computer technology in hydraulic engineering budget estimation, schools should increase the content of computer software teaching. Through software teaching, students can master the modern budgeting methods, improve work efficiency, adapt to the development of the industry, conducive to employment and better adapt to the future work.

### **4.4 Establish a Diversified Curriculum Evaluation System**

The traditional curriculum evaluation is mainly based on the final exam results, which is difficult to fully reflect the learning results and ability level of students. Therefore, a diversified course evaluation system should be established, including attendance, homework, class performance, in-class practice scores, final exams and other aspects. For example, attendance and class performance can account for 15 percent of the total grade, normal homework 25 percent of the total grade, in-class practice 30 percent, and

final exam 30 percent. Students' learning process and ability development can be comprehensively assessed through a variety of evaluation methods.

## 5 Conclusion

The teaching reform of Hydraulic Engineering Budget is an inevitable choice to meet the development needs of modern hydraulic engineering industry and the transformation of local universities into application-oriented undergraduate colleges. By optimizing the teaching content, innovating the teaching method, strengthening the practical teaching links and establishing a diversified curriculum evaluation system, the students' learning enthusiasm and practical ability can be effectively improved, and high-quality applied talents can be cultivated to meet the needs of society. However, teaching reform is a continuous process, which requires teachers to constantly explore and innovate, combine with the actual needs of the industry, and constantly improve the teaching content and methods.

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